FRBSF WEEKLY LETTER

April 29, 1988

October Postmortem

The causes and effects of the October 19, 1987 decline in world equity prices will be debated for many years. Already, a study by a presidential commission and reports by various agencies and industry groups have been completed, and a multitude of academic studies are underway. To a large extent, the considerable interest in the 1987 crash reflects the remarkable similarity between the pattern of price movements in 1929 and 1987 and the worry that subsequent events will be similarly severe.

This *Letter* reviews some of the explanations for the October crash. No single change in market fundamentals or flaw in the operation or regulation of financial markets explains the events of last October. This may favor the view that the October crash was the bursting of a speculative bubble. Proponents of this explanation argue that asset markets can and do produce "rational" price bubbles and breaks.

The events

The price break of October 1987, followed an historically rapid increase in U.S. and world equity prices. From January 1986 until its peak in August 1987, the Dow Jones Industrial Average (DJIA) increased about 200 percent. On October 1, 1986, the index stood at 1782 and barely a year later at 2600. The price-earnings ratio for the S&P 500 averaged 22 in October, compared to the 30-year average of 14.

Equity prices on most of the world's exchanges moved upward during this period as well. The most dramatic increases were on the Tokyo and Singapore exchanges, where share prices increased 220 and 250 percent, respectively, from the beginning of 1986 until the peak in 1987. Others were only slightly less dramatic: in the same period, London's index increased by 171 percent; Toronto's by 148 percent; and Switzerland's Swiss Bank Corp index by 136 percent. None of the world's major exchanges experienced a downturn during this period.

The price break in the United States began on Tuesday, October 12, with the DJIA declining by ten and one half percent by the end of the week. Individual day declines were large, but not record-breaking. Following the weekend of October 17-18, the U.S. stock indexes declined sharply, with the DJIA falling by 23 percent to 1738 on Monday, October 19. Sharp declines followed on all other world exchanges, with the Australia and Singapore exchanges falling most abruptly (by nearly 50 percent). The high-flying Japanese market fell modestly in comparison, declining less than 15 percent.

Chart 1 shows the magnitude of the price break in the DJIA, as well as the bumpy recovery of share prices since then. The DJIA now stands at around 2050.

Causes of the crash

The abrupt decline in equity prices has been attributed to numerous "fundamental" economic and "technical" factors. Fundamental factors are those that could be expected to alter the present discounted value of the earnings prospects of corporations and, hence, the value of their shares of equity. Such fundamental factors might include rising uncertainty about the outlook for the dollar and the trade balance, uncertainty about whether the Federal budget deficit would be resolved, and legislative attacks on leveraged takeovers.

All of these factors do, of course, have the potential to influence U.S. corporate share values. A sluggish recovery in net exports bodes ill for future corporate earnings and a sharply weakening dollar raises the possibility that U.S. interest rates would rise. Continued failure to resolve the federal budget deficit raises the prospect of future tax increases and slower economic growth. Finally, the prospect of adverse tax treatment of leveraged takeovers proposed by Congress in early October could make firms that were takeover candidates less attractive.

It is difficult to square the abrupt movements in the stock market indexes with these fundamental factors, however. All of these considerations had been elements in the behavior of the market for several years. It seems unlikely that these factors could have been reassessed within a space

of a few days in October. Moreover, these fundamental forces were advantageous to some overseas economies and thus the sharp declines in domestic equity markets elsewhere in the world should not have been ubiquitous.

Technical factors

A number of technical factors also have been examined for their role in the October 19 decline. Technical factors are those that affect the price-setting processes of the market, but not necessarily the assessment of the underlying value of individual firms. One such factor frequently mentioned is the behavior of portfolio insurers. Portfolio insurers provide institutional investors with "insurance" against the value of their portfolio dipping below a specified minimum. The insurers provide this protection by determining an appropriate balance between stock and cash in the portfolio. Carrying out portfolio insurance strategies generally involves selling equity futures into falling markets.

As the market began to fall in October, portfolio insurers sold equity futures heavily, as their strategy dictated. The Presidential Task Force on Market Mechanisms (the "Brady Commission") argued that this behavior of portfolio insurers was a key factor in the market's decline, pointing to the close coincidence in the timing of insurer sales and the intraday downticks in the market. Another practice, index arbitrage, which exploits pricing disparities by entering into opposite transactions in the future and cash markets, then transmitted the downward pressure on stock futures prices to the stock market itself.

Portfolio insurers, however, argue that their strategy is no different in concept than the stop-loss orders that have been employed routinely in the securities markets for a century. (A stop-loss order is one that instructs the broker to sell the specified shares whenever their price falls below a specified minimum.) In addition, they argue that their sales – roughly $10 billion during the market decline – were trivial compared to the total value of shares outstanding (roughly $3 trillion). Moreover, it is unlikely that these sales made the decline worse than it otherwise might have been since other investors would have been induced to buy if such sales had been "irrationally" mechanical.

Another frequently cited technical factor was the failure of the order and market-making mechanisms at the stock exchanges to keep pace with transactions volume. Economist Larry Harris has pointed out that the congestion in the cash market meant that index arbitrageurs could not be certain that they could sell stock (while buying the futures). This both reduced the buyers in the futures markets and increased the sellers, as traders moved activity from the cash to the futures market. The futures market declined in an exaggerated fashion as a consequence, as reflected in spreads of as much as 20 percent between cash and futures prices. In addition, because the futures market is a bellwether of the cash market, further downward pressure was then brought to bear on the stock (cash) markets themselves.

Speculative bubbles

The concept of speculative bubbles offers a third, though controversial, way of thinking about the causes of the October crash. A speculative bubble is a movement in the price of an asset that is unjustified by changes in fundamental or technical factors. Some economists argue that speculative bubbles can exist in markets that are otherwise "efficient." That is, speculative bubbles can exist even if individuals' behavior and expectations about the future are rational and markets clear without arbitrage opportunities.

A bubble may form, it is argued, when individuals find it difficult to evaluate fundamental factors. Thus, they may hold the asset at a high price simply because it has enjoyed substantial capital gains recently. Successively higher asset prices yield higher capital gains expectations and higher prices. Market participants may suspect that such a pricing process has some risk of crashing. However, unless it is certain that the price will crash in any one period, it may be rational for individuals to hold the asset, and for the price to rise until it crashes.

Such "capital gains bubbles" would seem less likely to occur in assets with easy to define fundamentals. The bond market, for example, will not exhibit speculative capital gains bubbles if investors are rational. This is because a bond's value at maturity is fixed and known. It would

Chart 1
The DOW Jones Industrial Average: 1929 and 1987

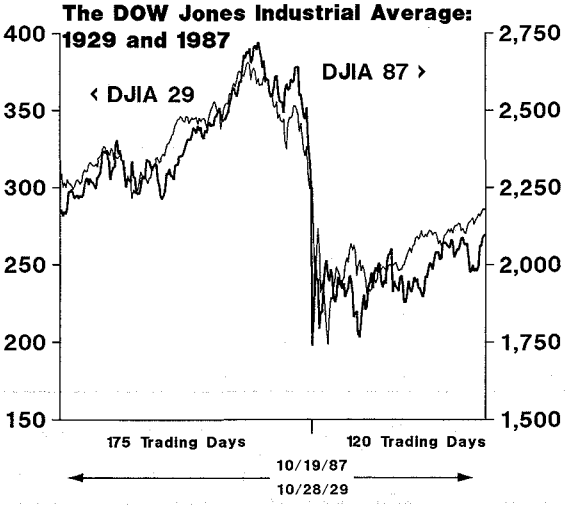
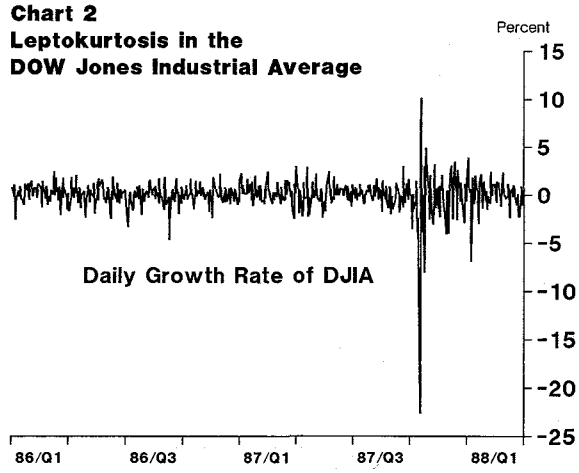


Chart 2
Leptokurtosis in the DOW Jones Industrial Average



be inconsistent for investors to hold bonds in the expectation that the price could rise without constraint, as is implied by the "capital gains bubble" process. (This is not to say, of course, that bond prices cannot change abruptly if "fundamental" interest rate or default risk expectations were to change.)

Was October 19th a bubble?

The fundamental value of corporate equities is much more difficult to define and – because they are non-par value, perpetual instruments – stocks are more susceptible to the processes that start capital gains bubbles. To identify possible "bubbles" in asset price data, economists use two simple types of tests. One test compares the volatility of actual asset prices with the volatility that would be expected from a "fundamental" model of these asset prices. Robert Shiller and other economists have argued that when actual volatility is "too high" based on these models, these asset prices must exhibit non-fundamental influences. An obvious weakness of such a test is that it is only as good as the underlying model; if the wrong "fundamental" model is used, the inferences drawn from price volatility will be incorrect.

A second type of test simply looks at the statistical behavior of asset prices independent of an underlying model. Some analysts argue that price movements in bubble-prone assets are characterized by long periods of stable rates of change punctuated by periods of very large positive or negative rates of change. Such a pattern in data is called "leptokurtosis."

Economists by no means agree on the usefulness of these tests to identify bubbles. They have been used, however, to argue that bubbles can exist in stock prices. Specifically, fundamental models of stock prices that use volatility in dividend flows to infer the "proper" volatility in stock prices fail to explain the high volatility of stock prices. Additionally, as Chart 2 shows, share price changes do tend to be distributed in a leptokurtic fashion.

Implications

The possibility that the stock price break of October 19, 1987, represented a bursting speculative bubble makes the events of that period much easier to interpret, and, and in many ways, much less ominous. Capital gains bubbles burst when the probability of their persisting declines; the severity of the October crash then could be reconciled with modest fundamental changes which affected this probability.

Similarly, the more severe movements in the prices of takeover shares also squares with the notion that they are more susceptible to bubbles because their fundamentals are more difficult to evaluate. The uncanny relationship between the October 1987 price movements and those of October 1929 then simply may be the bursting of two bubbles and may say very little about the similarities of the fundamental economic environments.

Randall Johnston Pozdena

Research Department
Federal Reserve
Bank of
San Francisco

Alaska Arizona California Hawaii Idaho
Nevada Oregon Utah Washington

NOTE

The table entitled, "Selected Assets and Liabilities of Large Commercial Banks in the Twelfth Federal Reserve District," will no longer be published in conjunction with the *Weekly Letter*. For those in need of these data, a more timely publication entitled, "Weekly Consolidated Condition Report of Large Commercial Banks and Domestic Subsidiaries" (F.R. 2416x), is available from the Statistical and Data Services Department of this Bank.